

U.S. and foreign productivity and unit labor costs

Between 1979 and 1995, output per hour in U.S. manufacturing grew at a slower rate than in several other countries, but modest growth in hourly compensation helped the United States to restrain growth in unit labor costs relative to its foreign competitors

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Labor productivity in U.S. manufacturing grew 3.4 percent in 1995, down about 1/2 percentage point from its 1994 performance. However, in a comparison of 11 industrial countries—the United States, Canada, Japan, and 8 Western European nations—only 3 countries (Italy, Japan, and Sweden) had higher productivity growth than the United States. In a comparison over the entire 1979–95 period, the United States fared less well—U.S. productivity growth rose faster than that of only 3 of 10 competitors, and only Norway had a slower rate of growth in the 1990s.

U.S. manufacturing unit labor costs were nearly unchanged in 1995, rising only 0.3 percent. In a comparison of 14 economies—a group that includes Denmark, Korea, and Taiwan, in addition to the 11 economies mentioned earlier—10 had greater unit labor cost increases than the United States, when unit labor costs are measured on a U.S. dollar basis to take account of relative changes in exchange rates. Unit labor costs increased by 10 percent or more in six European countries.

Between 1979 and 1995, half of the economies had rates of unit labor cost growth that were either less than or about the same as that of the United States. The U.S. rate ranked sixth lowest in the 1990s, compared with third lowest in the 1980s.

This article examines comparative trends in manufacturing productivity (output per hour) and

unit labor costs in 1995, the most recent year for which comparative data are available, and for the 1979–95 period. The analysis covers the United States, Canada, Japan, Belgium, France, Germany (the former West Germany), Italy, the Netherlands, Norway, Sweden, and the United Kingdom.

Comparative unit labor cost trends for Denmark, Korea, and Taiwan have been developed and are included in the analysis. However, the Bureau of Labor Statistics does not compute productivity measures for Korea and Taiwan because reliable labor input measures have not been developed. In addition, productivity measures for Denmark are not available due to a lack of hours data since 1993. (See the appendix for a description of the country measures.)

Comparative growth, 1994–95

Productivity. U.S. manufacturing labor productivity (output per hour) grew 3.4 percent in 1995, down from a 4.1-percent increase in 1994. All countries, except the United Kingdom, had positive productivity growth rates, with output per hour in France, Germany, and the Netherlands, increasing at roughly the U.S. rate. Productivity fell about 1 percent in the United Kingdom. (See table 1.)

The only two countries to improve performance in 1995, Italy and Japan, were 2 of 3 coun-

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tries with a greater increase in output per hour than the United States in 1995. In France and the Netherlands, productivity increases slowed from nearly 10 percent in 1994 to about 3 percent in 1995.

Output and labor input. The 1995 productivity increase in the United States resulted from output growth of 3.5 percent combined with only a 0.1-percent increase in labor input (as measured by hours worked). Productivity gains in most countries were achieved by a greater increase in output than in hours worked. Only Germany, Japan, and the Netherlands combined a decrease in hours with an increase in output to increase productivity.

The 3.5-percent increase in output placed the United States behind 5 of 13 competitor economies. The largest output increases were about 10 percent in Korea and Sweden; the smallest was in Germany, 1/2 percent.

Manufacturing employment in the United States rose 0.8 percent in 1995. Germany, Italy, Japan, and the Netherlands had declining employment in 1995, for at least the third consecutive year. All the other countries showed positive employment growth in 1995.

Hourly compensation costs. U.S. manufacturing hourly compensation costs, which comprise wages and salaries, supplements, and employer payments for Social Security and other employer-financed benefit plans, increased 3.7 percent in 1995. All of the countries had increases in hourly compensation costs in 1995, but only Germany, Norway, and Sweden had higher rates of increase than the United States. In France, the Netherlands, and the United Kingdom, growth rates of hourly compensation costs have slowed over the last 3 years.

Unit labor costs in national currency. Unit labor costs remained essentially flat for the United States, increasing only 0.3 percent in 1995. This made the United States 1 of 8 economies in which unit labor costs increased. The largest decreases were recorded by Japan and Taiwan, where unit labor costs dropped more than 2 percent. Korea is the only country in which unit labor costs have decreased in each of the past 3 years. Only two countries, Norway and the United Kingdom, have had increasing unit labor costs for 3 or more consecutive years.

Unit labor costs in U.S. dollars. To compare changes in competitiveness across economies, unit labor cost changes must be stated in a standard currency, such as the U.S. dollar. When a foreign currency appreciates against the U.S. dollar, more U.S. dollars are received in exchange for each national currency unit. An appreciating national currency will, therefore, increase unit labor costs when unit labor costs are converted from the national currency into U.S. dollars.

In 1995, changes in foreign exchange rates had an important impact on the competitive position (as measured by unit labor costs in U.S. dollars) of the United States relative to foreign economies. Ten foreign currencies appreciated against the dollar, with eight countries experiencing a more than 8-percent increase in the value of their currency relative to the U.S. dollar. The value of the Korean won and the British pound increased less than 5 percent against the U.S. dollar. Canada, Italy, and Taiwan experienced minimal currency depreciation in 1995.

On a U.S. dollar basis, unit labor costs increased 0.3 percent in the United States in 1995. Only Canada had a smaller increase, while Italy and Taiwan had decreases of about 2 percent. All other economies had larger increases in unit la-

Table 1. Annual percent changes in manufacturing productivity, unit labor costs, and related measures, 14 countries or areas, 1994-95

Country or area	Output per hour	Output	Total hours	Employment	Hourly compensation	Unit labor costs		Exchange rate
						National currency	U.S. dollars	
United States	3.4	3.5	0.1	0.8	3.7	0.3	0.3	—
Canada	1.0	3.8	2.8	2.4	1.6	.5	.1	-0.4
Japan	5.7	3.5	-2.1	-2.8	3.2	-2.4	6.1	8.7
Korea	(¹)	10.7	(¹)	(¹)	(¹)	-5	3.6	4.2
Taiwan	(¹)	6.1	(¹)	(¹)	(¹)	-2.1	-2.2	-1
Belgium	1.0	3.1	2.1	3.0	3.3	2.3	16.1	13.4
Denmark	(¹)	2.9	(¹)	3.3	(¹)	3.8	17.8	13.5
France	3.0	3.2	.2	.1	1.6	-1.3	9.8	11.2
Germany	3.1	.3	-2.7	-2.3	4.9	1.7	15.2	13.2
Italy	4.0	5.8	1.7	-1.4	3.1	-9	-2.0	-1.1
Netherlands	3.4	2.3	-1.0	-1.3	2.7	-7	12.6	13.4
Norway .....	.9	2.9	2.0	2.5	4.3	3.4	15.1	11.4
Sweden	5.1	9.8	4.5	3.5	6.2	1.1	9.2	8.1
United Kingdom	-8	2.2	3.0	2.4	1.0	1.7	4.8	3.0

¹ Data not available.

bor costs than the United States, with six countries having a rise of 10 percent or more.

Comparative trends, 1979–95

Manufacturing output data for the United States are not available prior to 1977. (See box below.) The analysis of long-term trends is restricted, therefore, to periods beginning in 1977. The period analyzed in this article begins in 1979 because it was a peak year for U.S. manufacturing output. For all of the foreign economies except Japan, manufacturing output also peaked around 1979.

Productivity. U.S. manufacturing output per hour increased at a 2.6-percent rate between 1979 and 1995, a rate higher than those of only three foreign economies. (See table 2.) Productivity growth was fastest in Belgium, Italy, and the United Kingdom, at rates of about 4 percent. Canada and Norway were the only economies that failed to achieve at least 2-percent average annual productivity growth.

U.S. productivity growth was the result of growth in output combined with a relatively small reduction in hours worked. Output increases were entirely responsible for productivity growth in Canada and Japan over the same period, as hours worked remained flat in both countries. In contrast, reductions in hours worked played an important role in increasing productivity in the European countries. Hours worked declined in each of the European countries by at least 1 percent annually and in several of these countries, in which output rose only slightly, reductions in hours worked played a dominant role in driving productivity growth.

Output. The annual increase of 2.1 percent in U.S. manufacturing output placed the United States in a cluster that in-

cluded four European countries having at least a 2-percent rise. France, Germany, Norway, and the United Kingdom lagged behind with output increases of less than 1 percent. Output rose at the fastest rate in the Asian economies—10 percent in Korea, 6–1/2 percent in Taiwan, and 3–1/2 percent in Japan.

Employment and total hours. U.S. manufacturing employment fell an average of 0.8 percent per year between 1979 and 1995. Most of the drop in employment occurred during the first 4 years of that period; since 1983, employment had risen slightly. Except for Denmark, where employment growth was essentially flat, the European countries also experienced declines in employment over that period, ranging from about 1 percent per year in Germany and the Netherlands to more than 3 percent annually in the United Kingdom, where manufacturing employment fell to 60 percent of its 1979 level. The only country to increase employment was Japan, which did so by an average 1/2 percent per year.

From 1979 to 1995, total hours worked also declined in all of the countries except Canada and Japan, where hours-worked levels did not change significantly. Total hours fell in the United States by 1/2 percent per year and in a range of 1 percent to 4 percent in the European countries. As with the decline in employment, the United Kingdom had the largest decline in total hours, 3–1/2 percent per year.

Unit labor costs in the 1980s and 1990s

For the analysis of unit labor costs, a breakdown of the 1979–95 period into three smaller periods—1979–85, 1985–90, and 1990–95—is revealing. Such divisions take account of large fluctuations in the value of the U.S. dollar over the longer period. The trade-weighted value of the dollar rose sharply

The U.S. output measure

Beginning with this article, the output measure for the United States is the chain-weighted value-added index introduced by the Bureau of Economic Analysis (BEA) in August 1996. This series is based on annually changing price weights. For more information, see Robert E. Yuskavage, “Improved Estimates of Gross Product by Industry, 1959–94,” *Survey of Current Business*, August 1996, pp. 133–55.

Prior to this article, the U.S. output measure was based on a fixed price weight scheme in which the price weights were not changed over the entire 1977–95 period. The chain-weighted series, introduced by BEA in August 1996, replaced the fixed-weighted series as the manufacturing output measure published with the national accounts.

The U.S. output series used for international compari-

sons differs from the manufacturing series that BLS publishes in its news releases on quarterly measures of U.S. productivity and costs. While both series are based on annually changing price weights, the quarterly U.S. manufacturing series is on a “sectoral” output basis rather than on a value added basis. Sectoral output is gross output less intrasector transactions. (See William Gullickson, “Measurement of productivity growth in U.S. manufacturing,” *Monthly Labor Review*, July 1995, pp. 13–28.)

A review of the preferred output concept for international comparative measures, as well as of the availability of data for producing alternative output series in foreign economies, is under way.

Table 2. Annual percent changes in manufacturing productivity, unit labor costs, and related measures, 14 countries or areas, selected periods, 1979-95

Country or area	Output per hour	Output	Total hours	Employment	Hourly compensation	Unit labor costs		Exchange rate
						National currency	U.S. dollars	
United States:								
1979-95	2.6	2.1	-0.5	-0.8	5.0	2.3	2.3	—
1979-85	3.3	2.0	-1.2	-1.4	7.1	3.7	3.7	—
1985-90	2.2	2.2	.0	-1	3.9	1.6	1.6	—
1990-95	2.3	2.1	-2	-6	3.7	1.4	1.4	—
Canada:								
1979-95	1.7	1.7	-1	-3	5.3	3.5	2.5	-1.0
1979-85	2.4	1.5	-9	-8	8.7	6.1	3.4	-2.5
1985-90 .....	.4	1.5	1.1	1.1	4.1	3.7	7.1	3.2
1990-95	2.3	2.0	-3	-1.0	2.6	.3	-2.9	-3.2
Japan:								
1979-95	3.4	3.4	.0	.5	4.4	1.0	6.5	5.4
1979-85	3.5	4.7	1.1	1.2	4.7	1.2	-3	-1.5
1985-90	4.3	4.8	.5	.8	4.6	.3	10.8	10.5
1990-95	2.3	.4	-1.9	-5	4.0	1.6	10.9	9.1
Korea:								
1979-95	(¹)	9.9	(¹)	(¹)	(¹)	5.4	2.4	-2.9
1979-85	(¹)	8.8	(¹)	(¹)	(¹)	9.2	-.9	-9.3
1985-90	(¹)	13.2	(¹)	(¹)	(¹)	6.0	10.5	4.2
1990-95	(¹)	8.0	(¹)	(¹)	(¹)	.5	-1.2	-1.7
Taiwan:								
1979-95	(¹)	6.7	(¹)	(¹)	(¹)	4.2	6.2	1.9
1979-85	(¹)	8.1	(¹)	(¹)	(¹)	7.3	5.5	-1.7
1985-90	(¹)	7.0	(¹)	(¹)	(¹)	3.5	12.0	8.2
1990-95	(¹)	4.8	(¹)	(¹)	(¹)	1.1	1.5	.3
Belgium:								
1979-95	3.9	2.0	-1.8	-1.7	5.5	1.6	1.6	.0
1979-85	6.1	2.6	-3.3	-2.7	7.8	1.6	-9.7	-11.1
1985-90	2.3	2.6	.2	-.4	3.9	1.5	13.8	12.2
1990-95	2.8	.7	-2.0	-1.8	4.6	1.8	4.4	2.5
Denmark:								
1979-95	(¹)	1.3	(¹)	.1	(¹)	4.2	3.7	-.4
1979-85	2.1	2.9	.8	1.0	8.1	5.9	-5.8	-11.0
1985-90 .....	.1	-.5	-.6	-.1	5.4	5.2	17.2	11.4
1990-95	(¹)	1.3	(¹)	-.9	(¹)	1.0	3.1	2.0
France:								
1979-95	3.1	.7	-2.3	-1.9	7.1	3.9	2.9	-1.0
1979-85	3.0	-.4	-3.3	-2.3	12.7	9.5	-3.4	-11.7
1985-90	3.4	2.6	-.8	-.9	4.5	1.0	11.6	10.5
1990-95	2.8	.2	-2.5	-2.5	3.3	.5	2.3	1.8
Germany:								
1979-95	2.2	.4	-1.7	-.9	5.5	3.2	4.9	1.6
1979-85	2.1	.2	-1.8	-1.1	5.9	3.8	-4.1	-7.6
1985-90	2.1	2.3	.3	1.1	4.9	2.8	15.9	12.7
1990-95	2.4	-1.2	-3.5	-2.8	5.5	3.0	5.6	2.5
Italy:								
1979-95	3.8	2.3	-1.5	-1.9	10.0	6.0	1.6	-4.1
1979-85	4.9	1.7	-3.1	-2.9	16.7	11.2	-3.2	-12.9
1985-90	2.6	4.0	1.3	.3	6.9	4.2	14.3	9.8
1990-95	3.7	1.3	-2.3	-2.8	5.5	1.7	-4.3	-6.0
Netherlands:								
1979-95	3.3	2.0	-1.3	-1.1	3.7	.4	1.8	1.4
1979-85	4.4	1.8	-2.5	-2.3	4.9	.5	-7.6	-8.0
1985-90	1.9	3.1	1.2	1.4	2.1	.2	12.9	12.7
1990-95	3.3	1.1	-2.1	-2.1	3.9	.6	3.2	2.6
Norway:								
1979-95	1.9	.4	-1.5	-1.5	7.3	5.3	3.8	-1.4
1979-85	2.9	1.0	-1.9	-1.8	10.0	6.9	-2.1	-8.4
1985-90	1.4	-1.8	-3.1	-2.9	8.1	6.6	13.6	6.6
1990-95	1.3	2.1	.8	.4	3.4	2.1	1.9	-.3

Table 2. Continued—Annual percent changes in manufacturing productivity, unit labor costs, and related measures, 14 countries or areas, selected periods, 1979–95

Country or area	Output per hour	Output	Total hours	Employment	Hourly compensation	Unit labor costs		Exchange rate
						National currency	U.S. dollars	
Sweden:								
1979–95	3.3	2.1	–1.2	–1.8	7.5	4.1	0.8	–3.1
1979–85	3.0	2.2	–.8	–1.2	9.6	6.4	–5.2	–11.0
1985–90	1.8	1.2	–.5	–.8	8.5	6.6	14.9	7.8
1990–95	5.1	2.8	–2.2	–3.6	4.1	–1.0	–4.6	–3.7
United Kingdom:								
1979–95	4.2	.7	–3.4	–3.2	9.0	4.5	2.6	–1.8
1979–85	4.4	–1.2	–5.3	–4.9	11.8	7.1	–1.3	–7.9
1985–90	4.6	3.4	–1.2	–1.2	8.7	3.9	10.7	6.6
1990–95	3.7	.3	–3.2	–3.1	5.9	2.1	–.3	–2.4

¹ Data not available.

from 1979 to 1985, plummeted between 1985 and 1990, and fell at a moderate rate between 1990 and 1995. These changes in the value of the dollar have important ramifications for the relative competitiveness of economies, as measured in U.S. dollar-based unit labor costs.

Hourly compensation costs. Unit labor costs can be calculated as compensation per hour divided by output per hour, or hourly compensation divided by productivity. Thus, high growth rates in hourly compensation relative to other countries have a negative impact on a country's competitive position as reflected in comparative unit labor cost growth rates. In the United States, between 1979 and 1995, hourly compensation increased 5 percent per year, a lower rate than in all other countries except Japan and the Netherlands. This relatively slow rise in hourly compensation played an important role in improving U.S. competitiveness during the 1979–95 period, offsetting lagging U.S. productivity growth rates vis-à-vis many of the European countries. For example, in Italy and the United Kingdom, which had higher rates of productivity growth than the United States, increases in hourly compensation growth were approximately double the U.S. rate.

Hourly compensation costs in all of the economies grew rapidly between 1979 and 1985, then grew more slowly over the next 10 years. The U.S. performance was indicative of that in several countries—hourly compensation rose 7 percent in the 1979–85 period before leveling off at an average rate slightly less than 4 percent over the next decade. Hourly compensation growth slowed in each of the foreign economies as well in the 1985–90 period, with seven economies further reducing the rate of hourly compensation growth after 1990.

Unit labor costs in national currency. Over the entire period studied, moderate productivity growth and relatively slow compensation growth combined to increase unit labor

costs in the United States at a rate of 2.3 percent—the fourth slowest rate among the 14 economies studied. Despite having one of the highest rates of productivity growth, Italy had the largest rate of increase in unit labor costs, at 6 percent, attributable to an average annual increase in hourly compensation costs of 10 percent.

Between 1979 and 1985, unit labor costs rose at a fairly fast clip in many economies, reflecting large increases in hourly compensation costs. Unit labor costs increased more than 9 percent per year in France, Italy, and Korea, while in six other economies they increased at rates between about 6 percent and 8 percent. The increase in U.S. unit labor costs during this period was 3.7 percent.

Unit labor cost growth then slowed or stayed about the same in all economies during the 1985–90 period. The rate of increase in the United States slowed to 1–1/2 percent. Only Korea and the Scandinavian countries continued to post increases of more than 5 percent per year.

Although U.S. unit labor costs continued to grow at the same rate in the 1990s, for six other economies, the growth of unit labor costs slowed to 1 percent or less, and unit labor costs actually decreased slightly in Sweden. Japan, which had one of the lowest rates of unit labor cost growth in the 1985–90 period, had the same rate in the 1990–95 period as the United States (1–1/2 percent).

Unit labor costs in U.S. dollars. Changes in the value of an economy's currency relative to those of competitor economies must be taken into account when considering the competitiveness of an economy's goods in international markets. Changes in unit labor costs measured in U.S. dollars—to adjust for relative changes in currency exchange rates—are a better indicator of changes in competitiveness than are changes in unit labor costs measured on a national currency basis.

Fluctuations in exchange rates relative to the U.S. dollar caused wide swings in unit labor costs when measured on a U.S. dollar basis. Between 1979 and 1985, the currencies of all the economies studied depreciated relative to the U.S. dollar. This effect was especially pronounced in Europe and Korea, where the value of each currency depreciated between 7 percent and 13 percent per year. The Canadian dollar, the Japanese yen, and the New Taiwan dollar depreciated by a more modest amount—2 percent per year.

While no economy had declining unit labor costs when measured on a national currency basis during 1979–85, the strong dollar was responsible for all economies except the United States, Canada, and Taiwan having declines in unit labor costs when measured on a U.S. dollar basis. In Belgium, which had one of the weaker European currencies, unit labor costs fell at a rate of 9–1/2 percent per year. Denmark, the Netherlands, and Sweden also experienced declines in unit labor costs by 5 percent per year or more. The 3–1/2-percent unit labor cost increase in the United States was exceeded only in Taiwan, where national currency unit labor costs rose too fast to be offset by a depreciating currency.

After deteriorating against most economies during the 1979–85 period, the U.S. competitive position rebounded in the 1985–90 period, attributable to the depreciation of the U.S. dollar. The European currencies all appreciated between 6 percent and 13 percent per year against the dollar, while the yen rose 10–1/2 percent annually. The Canadian dollar, the Korean won, and the New Taiwan dollar also increased in value relative to the U.S. dollar. As a result, there was double-digit average annual growth in unit labor costs (U.S. dollar-based) for all foreign economies except Canada, where unit labor costs increased 7 percent. In the United States, unit labor costs rose modestly by 1–1/2 percent.

In the 1990–95 period, exchange rate trends again played a large role in the U.S. competitive position, but unlike the previous periods, the competitive position improved relative to some economies, notably Japan, while deteriorating relative to others, particularly Italy and Sweden. The strength of the yen, which appreciated 9 percent per year between 1990 and 1995, caused Japanese unit labor costs (U.S. dollar-based) to rise at a rate of 11 percent per year. Unit labor costs (U.S. dollar-based) fell 4–1/2 percent annually in Italy and Sweden and dropped slightly in the United Kingdom, attributable in large part to depreciating currencies. Stronger European currencies, however, such as those in Belgium, Germany, and the Netherlands, appreciated 2–1/2 percent against the dollar and consequently contributed to larger unit labor cost increases (between 3 percent and 6 percent, on a U.S. dollar basis).

Over the 1979–95 period, exchange rates fluctuated considerably, but over the whole period, most currencies either appreciated or depreciated an average of 2 percent or less per

year against the U.S. dollar. Thus, the effect of currency movements on unit labor costs in U.S. dollars was moderate over the long term, with a couple of exceptions. The Italian lira depreciated, on average, 4 percent per year and the Swedish krona declined an average of 3 percent per year against the dollar. Therefore, the competitive positions of both these countries improved relative to the United States, even though they had higher unit labor cost growth on a national currency basis. In contrast, Japanese unit labor costs (on a U.S. dollar basis) rose at the fastest rate, 6–1/2 percent, because the yen appreciated an average of 5–1/2 percent yearly between 1979 and 1995.

Trends in competitiveness

To take account of differences in the relative importance of foreign economies to U.S. trade in manufactured goods, BLS constructs indexes of U.S. unit labor cost trends relative to a trade-weighted average of unit labor cost trends in the other economies. The trade weights used to construct these indexes are based on an International Monetary Fund study of trade flows and other sources. Using these trade weights, Canada is weighted at 24 percent, Japan at 29 percent, Europe at 36 percent, and Korea and Taiwan at 5–1/2 percent each. (A complete listing of trade weights for each of the economies can be found in the appendix.)

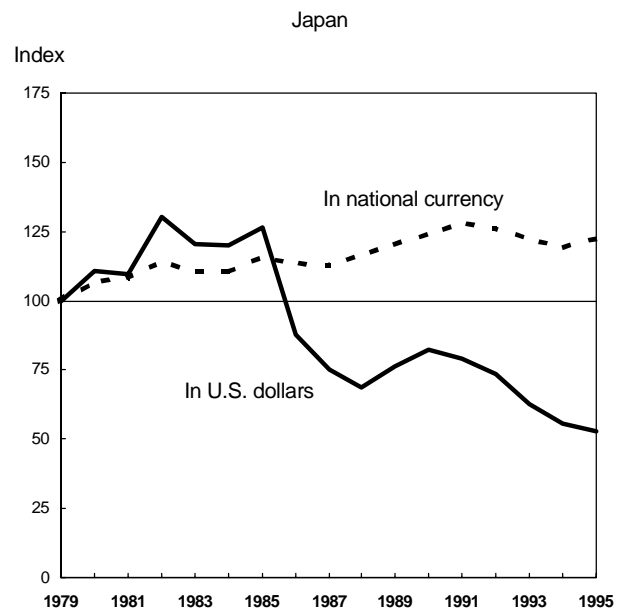
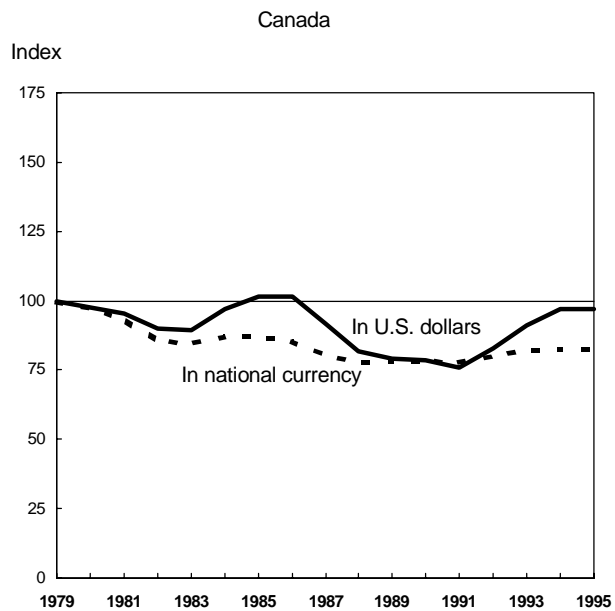
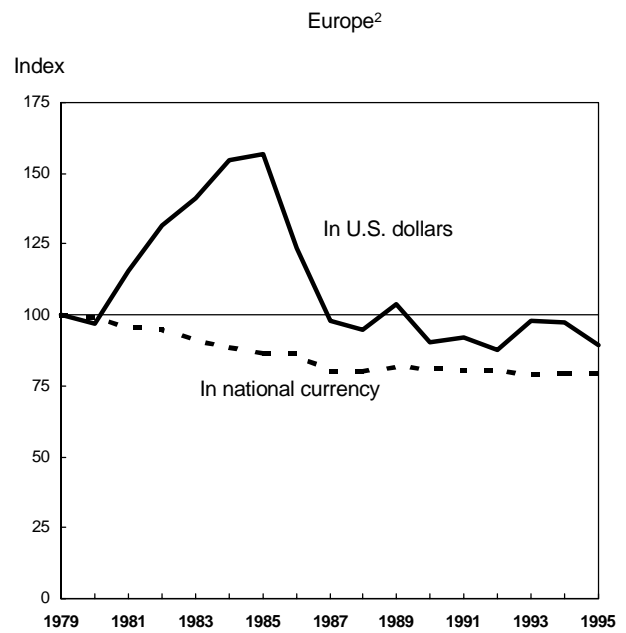
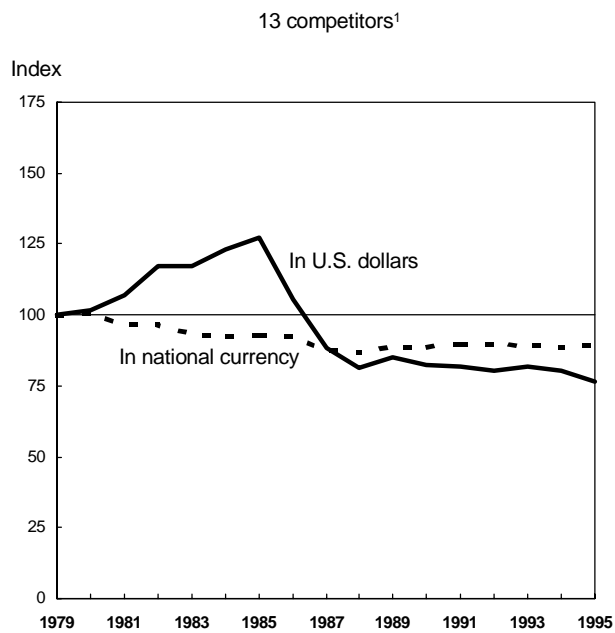
The construction of the trade-weighted indexes is a three-step process. First, the indexes of unit labor costs for all economies are rebased to a common year (in this case, 1979 = 100). Second, for each year, a “competitors” index is calculated as the weighted geometric mean of the indexes for all competitor economies. Finally, the U.S. index number for each year is divided by the competitors index number (and multiplied by 100) to obtain a relative ratio of the United States to the competitors. This process is used to calculate relative trade-weighted unit labor cost indexes on both a national currency and a U.S. dollar basis.

Chart 1 shows the growth rate of U.S. unit labor costs relative to the growth rates of foreign competitors’ costs. An ascending line in the chart indicates that U.S. costs either rose at a faster rate or declined at a slower rate than competitors’ costs. A descending line indicates that U.S. costs either rose at a slower rate or declined at a faster rate than competitors’ costs.

Table 3 shows average annual percent changes in U.S. unit labor costs relative to all 13 economies as a whole and to each economy individually.

Relative unit labor costs in national currency. U.S. unit labor costs declined at an average 0.7 percent per year relative to a trade-weighted average of unit labor costs in 13 competitor countries over the 1979–95 period. Relative to most of

Chart 1. U.S. unit labor costs in manufacturing relative to competitors, 1979-95



¹The 13 competitors are Belgium, Canada, Denmark, France, Germany, Italy, Japan, Korea, the Netherlands, Norway, Sweden, Taiwan, and the United Kingdom.

²The European competitors are Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Sweden, and the United Kingdom.

NOTE: 1979 = 100.

Table 3. Average annual percent changes in U.S. unit labor costs in manufacturing relative to 13 competitors, selected periods, 1979–95

Country or area	National currency basis				U.S. dollar basis			
	1979–95	1979–85	1985–90	1990–95	1979–95	1979–85	1985–90	1990–95
13 competitors	–0.7	–1.2	–0.9	0.0	–1.7	4.1	–8.3	–1.5
Canada	–1.2	–2.3	–2.0	1.1	–.2	.2	–5.1	4.4
Japan	1.3	2.5	1.4	–.3	–3.9	4.0	–8.2	–8.6
Korea	–3.0	–5.1	–4.2	.8	.1	4.7	–8.0	3.3
Taiwan	–1.9	–3.4	–1.8	–.2	–3.8	–1.7	–9.2	–.5
Europe	–1.4	–2.3	–1.3	–.4	–.7	7.8	–10.4	–.3
Belgium .....	.7	2.1	.1	–.4	.7	14.8	–10.7	–2.9
Denmark	–1.8	–2.1	–3.4	.4	–1.4	10.0	–13.3	–1.6
France	–1.6	–5.3	.6	.9	–.6	7.3	–9.0	–.9
Germany	–.9	–.1	–1.1	–1.6	–2.4	8.1	–12.3	–4.0
Italy	–3.5	–6.8	–2.4	–.4	.7	7.1	–11.1	6.0
Netherlands	1.9	3.2	1.5	.8	.5	12.2	–10.0	–1.8
Norway	–2.8	–3.0	–4.6	–.7	–1.5	5.9	–10.5	–.5
Sweden	–1.7	–2.6	–4.7	2.4	1.5	9.4	–11.5	6.3
United Kingdom	–2.1	–3.2	–2.2	–.7	–.3	5.1	–8.2	1.7

Europe, Canada, Korea, and Taiwan, U.S. relative unit labor costs declined by 1 percent per year or more, but those declines were offset somewhat by increases in unit labor costs relative to Belgium, Japan, and the Netherlands.

Relative unit labor costs on a U.S. dollar basis. U.S. competitiveness improved between 1979 and 1995. Unit labor costs, adjusted for changes in the value of the U.S. dollar, declined relative to the 13 competitors at a rate of 1.7 percent per year, which was about twice as fast as the improvement on a national currency basis. Dollar-adjusted unit labor costs in the United States declined only slightly relative to Canada and Europe as a whole; the major factor in the improvement of the U.S. competitive position was the strong increase in the value of the Japanese yen, which helped improve the U.S. position relative to Japan by an average of 3.9 percent per year.

During 1979–85, the value of the U.S. dollar appreciated 5–1/2 percent per year relative to competitor currencies, causing unit labor costs in the United States to rise 4 percent annually relative to competitors. Although U.S. unit labor costs rose relative to all economies except Taiwan, depreciating European currencies played the largest role in the deterioration of the U.S. competitive position. Relative to Europe, U.S. unit labor costs increased at a rate of nearly 8 percent per year. Unit labor costs relative to Japan rose 4 percent per year, and increased less than 1/2 percent per year relative to Canada.

The 1985–90 period stood in sharp contrast to the 1979–

85 period, as the value of the U.S. dollar plummeted 7–1/2 percent per year relative to competitor currencies. The dollar's drop was primarily responsible for a nearly 8–1/2-percent-per-year improvement in the U.S. competitive position, that is, an 8–1/2 percent per year drop in U.S. unit labor costs relative to competitors. U.S. unit labor costs fell 10–1/2 percent per year relative to Europe, attributable mostly to the dollar's 9-percent per year depreciation against European currencies. The dollar declined even more against the Japanese yen, but U.S. unit labor costs rose at a faster rate than Japanese unit labor costs (on a national currency basis), so the U.S. competitive position relative to Japan improved at a rate of only 8 percent per year.

The 1–1/2-percent average annual improvement of the U.S. competitive position in 1990–95 was attributable entirely to a further weakening of the dollar, particularly against the Japanese yen. The dollar fell about 8–1/2 percent per year relative to the yen, and U.S. unit labor costs relative to Japan fell by a similar amount. There was little change in the U.S. competitive position relative to Europe, but U.S. unit labor costs did deteriorate 4–1/2 percent per year relative to Canada, offsetting some of the improvement relative to Japan.

IN SUMMARY, the competitive position of U.S. manufacturing deteriorated during 1979–85, improved strongly during 1985–90, and improved moderately during 1990–95. The end result is that the U.S. competitive position in 1995 was improved relative to 1979. □

Appendix: Measuring trend indexes of labor productivity in manufacturing

The Bureau of Labor Statistics constructs trend indexes of manufacturing labor productivity (output per hour), hourly compensation costs, and unit labor costs from three basic aggregate measures—output, total labor hours, and total compensation. The hours and compensation measures refer to all employed persons, including self-employed persons and unpaid family workers, in the United States, Canada, Japan, France, Germany, Norway, and Sweden and to all employees (wage and salary earners) in the other economies. For all of the countries, the term “hours” refers to hours worked.

In general, the measures relate to total manufacturing as defined by the International Standard Industrial Classification (ISIC). However, the measures for France and Italy refer to mining and manufacturing less energy-related products.

Output. For most countries, the output measures are value added in manufacturing from the national accounts. However, the national accounts measures for the United Kingdom are essentially identical to their indexes of industrial production. While methods of deriving national accounts measures differ from country to country, BLS has reviewed these methods and determined that the series are sufficiently comparable for measuring comparative trends in productivity and unit labor costs.

In this article, the 1977–94 manufacturing output data for the United States are the gross product originating (value added) measures prepared by the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce. Comparable manufacturing output data currently are not available prior to 1977. The 1994–95 percent change in manufacturing output is based on the trend shown by the industrial production index published by the U.S. Federal Reserve Board for the manufacturing sector.

U. S. gross product originating is a chain-type annual-weighted series.¹ The Japanese value-added series is based upon one set of fixed price weights for the years 1970 through 1995. Output series for the other foreign economies also employ fixed price weights, but the weights are updated periodically (for example, every 5 or 10 years). The only exception is the 1987–94 output series for Norway, in which a given year’s output is weighted with the preceding year’s prices. However, the 1995 measures are currently based on 1993 prices.

The manufacturing output series that BLS publishes in its news releases on quarterly measures of U.S. productivity and costs was changed in February 1996 from a value-added basis to a “sectoral output” basis. Sectoral output is gross output less intrasector transactions. However, to preserve the comparability of the U.S. measures with those for other economies, BLS continues to use gross product originating in manufacturing for the United States for these comparative measures.

Labor input. The total hours measures are developed from statistics of manufacturing employment and average hours. The series used for France, Norway, and Sweden are official series published with the national accounts. Where official total hours series are not available, the measures are developed by BLS using employment figures published with the national accounts, or other comprehensive employment series, and estimates of annual hours worked. For Germany, BLS uses estimates of average hours worked, developed by a research institute connected to the Ministry of Labor for use with the national accounts employment figures. For the other countries, BLS constructs its own estimates of average hours.

Denmark has not published estimates of average hours for 1994

and 1995 and, therefore, the BLS measure of labor input for Denmark ends in 1993. For Korea and for Taiwan, BLS publishes only measures of unit labor costs and the data on output and total compensation that underlie the computations of unit labor costs. Total hours, and consequently productivity, are not computed for Korea and Taiwan because BLS has not yet developed adequate labor input series.

Compensation (labor cost). The compensation measures are from the national accounts except those for Belgium, which are developed by BLS using statistics on employment, average hours, and hourly compensation. Compensation includes employer expenditures for legally required insurance programs and contractual and private benefit plans, in addition to all payments made in cash or in-kind directly to employees. For France and Sweden, compensation is increased to account for other significant taxes on payroll or employment. For the United Kingdom, compensation through 1991 is reduced to account for subsidies. Self-employed workers are included in the all-employed-persons measures by assuming that their hourly compensation is equal to the average for wage and salary employees.

Current indicators. The measures for recent years may be based on current indicators of output (such as industrial production indexes), employment, average hours, and hourly compensation until national accounts and other statistics normally used for the long-term measures become available.

Trade-weighted measures. The trade weights for Canada, Japan, and the European countries were obtained by rescaling a series of weights, developed by the International Monetary Fund, based on average trade flows over the 1989–91 period. These weights are based on aggregate trade data for total manufacturing and take account of both bilateral trade and the relative importance of “third country” markets. The 1989–91 weights do not include Korea and Taiwan. Using data from an earlier study from the International Monetary Fund and other sources, BLS developed weights for Korea and Taiwan.

The following weights were used for the entire period for which trade-weighted unit labor cost measures are produced:

Country	Weight
Canada	23.94
Japan	28.91
Belgium	2.02
Denmark	.45
France	5.58
Germany	10.98
Italy	4.35
Netherlands	2.13
Norway	.45
Sweden	1.79
United Kingdom	8.50
Korea	5.43
Taiwan	5.48

Level comparisons. The BLS measures are limited to trend comparisons. BLS does not prepare level comparisons of manufacturing productivity and unit labor costs because of data limitations and

technical problems in comparing the levels of manufacturing output among countries. Each country measures manufacturing output in its own currency units. To compare outputs among countries, a common unit of measure is needed. Market exchange rates are not suitable as a basis for comparing output levels. What are needed are purchasing power parities, which are the number of foreign currency units required to buy goods and services equivalent to what can be bought with one unit of U.S. currency.

Purchasing power parities are available for total gross domestic product (GDP) for the United Nations International Comparisons Project. However, these parities are derived for expenditures made by consumers, business, and government for goods and services—not for value added by industry. Therefore, they do not provide purchasing power parities by industry. The parities for total GDP are not suitable for each component industry, such as manufacturing.

Some analysts have constructed “proxy purchasing power parities” for manufacturing, using selected expenditure items from the United Nations International Comparisons Project. However, the prices used in this method have a number of shortcomings because they are based on consumer, business, and government final expenditures. Some of the drawbacks are that the data are based on final sales values rather than industry value added or gross output; they include indirect taxes, distribution margins, and transportation costs; they include the prices of imports and exclude the prices of exports;

and there are few prices for products, such as steel, paper, and cement, which are outputs of the manufacturing sector, but only intermediate inputs with respect to final expenditures.

A different approach has been used by researchers at the International Comparisons of Output and Productivity project at the University of Groningen in the Netherlands. They develop unit value ratios based on ratios of producers’ sales values per unit of output for matched products from other countries’ censuses of manufactures. This procedure also has shortcomings, primarily because only a portion of manufactured products can be matched and the matched products may not be adequately representative. For many products, values are reported but not quantities; for some products, there is no counterpart in the other country; and other products cannot be matched because they represent a different mix of product varieties or because of large differences in qualities.²

Footnotes to the appendix

¹ For more information on the U.S. measure, see Robert E. Yuskavage, “Improved Estimates of Gross Product by Industry, 1959–94,” *Survey of Current Business*, August 1996, pp. 133–55.

² For an article based on this approach, see Bart van Ark, “Manufacturing prices, productivity, and labor costs in five economies,” *Monthly Labor Review*, July 1995, pp. 56–72.

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Table 1. Annual percent changes in manufacturing productivity, unit labor costs, and related measures, 14 countries or areas, 1994–95

Country or area	Output per hour	Output	Total hours	Employment	Hourly Compensation	National Currency	U.S. dollars	Exchange rate
United States	3.4	3.5	.1	.8	3.7	.3	.3	—
Canada	1.0	3.8	2.8	2.4	1.6	.5	.1	−0.4
Japan	5.7	3.5	−2.1	−2.8	3.2	−2.4	6.1	8.7
Korea	(¹)	10.7	(¹)	(¹)	(¹)	−0.5	3.6	4.2
Taiwan	(¹)	6.1	(¹)	(¹)	(¹)	−2.1	−2.2	−0.1
Belgium	1.0	3.1	2.1	3.0	3.3	2.3	16.1	13.4
Denmark	(¹)	2.9	(¹)	3.3	(1)	3.8	17.8	13.5
France	3.0	3.2	.2	.1	1.6	−1.3	9.8	11.2
Germany	3.1	.3	−2.7	−2.3	4.9	1.7	15.2	13.2
Italy	4.0	5.8	1.7	−1.4	3.1	−0.9	−2	−1.1
Netherlands	3.4	2.3	−1	−1.3	2.7	−0.7	12.6	13.4
Norway .....	.9	2.9	2.0	2.5	4.3	3.4	15.1	11.4
Sweden	3.4	9.4	5.8	4.1	5.4	2.0	10.2	8.1
United Kingdom	−0.8	2.2	3.0	2.4	1.0	1.7	4.8	3.0

¹ Data not available

Annual percent changes in manufacturing productivity, unit labor costs, and related measures, 14 countries or areas, selected periods, 1979-95								
Country or area	Output per hour	Output	Total hours	Employment	Hourly Compensation	National Currency	U.S. dollars	Exchange rate
United States:								
1979-95	2.6	2.1	-0.5	-0.8	5.0	2.3	2.3	—
1979-85	3.3	2.0	-1.2	-1.4	7.1	3.7	3.7	—
1985-90	2.2	2.2	.0	-.1	3.9	1.6	1.6	—
1990-95	2.3	2.1	-2	-6	3.7	1.4	1.4	—
Canada:								
1979-95	1.7	1.7	-.1	-.3	5.3	3.5	2.5	-1
1979-85	2.4	1.5	-.9	-.8	8.7	6.1	3.4	-2.5
1985-90 .....	.4	1.5	1.1	1.1	4.1	3.7	7.1	3.2
1990-95	2.3	2.0	-.3	-1	2.6	.3	-2.9	-3.2
Japan:								
1979-95	3.4	3.4	.0	.5	4.4	1.0	6.5	5.4
1979-85	3.5	4.7	1.1	1.2	4.7	1.2	-.3	-1.5
1985-90	4.3	4.8	.5	.8	4.6	.3	10.8	10.5
1990-95	2.3	.4	-1.9	-5	4.0	1.6	10.9	9.1
Korea:								
1979-95	(1)	9.9	(1)	(1)	(1)	5.4	2.4	-2.9
1979-85	(1)	8.8	(1)	(1)	(1)	9.2	-.9	-9.3
1985-90	(1)	13.2	(1)	(1)	(1)	6.0	10.5	4.2
1990-95	(1)	8.0	(1)	(1)	(1)	.5	-1.2	-1.7
Taiwan:								
1979-95	(1)	6.7	(1)	(1)	(1)	4.2	6.2	1.9
1979-85	(1)	8.1	(1)	(1)	(1)	7.3	5.5	-1.7
1985-90	(1)	7.0	(1)	(1)	(1)	3.5	12.0	8.2
1990-95	(1)	4.8	(1)	(1)	(1)	1.1	1.5	.3
Belgium:								
1979-95	3.9	2.0	-1.8	-1.7	5.5	1.6	1.6	.0
1979-85	6.1	2.6	-3.3	-2.7	7.8	1.6	-9.7	-11.1
1985-90	2.3	2.6	.2	-.4	3.9	1.5	13.8	12.2
1990-95	2.8	.7	-2	-1.8	4.6	1.8	4.4	2.5
Denmark:								
1979-95	(1)	1.3	(1)	.1	(1)	4.2	3.7	-.4
1979-85	2.1	2.9	.8	1.0	8.1	5.9	-5.8	-11
1985-90 .....	.1	-.5	-.6	-.1	5.4	5.2	17.2	11.4
1990-95	(1)	1.3	(1)	-.9	(1)	1.0	3.1	2.0
France:								
1979-95	3.1	.7	-2.3	-1.9	7.1	3.9	2.9	-1
1979-85	3.0	-.4	-3.3	-2.3	12.7	9.5	-3.4	-11.7
1985-90	3.4	2.6	-.8	-.9	4.5	1.0	11.6	10.5
1990-95	2.8	.2	-2.5	-2.5	3.3	.5	2.3	1.8
Germany:								
1979-95	2.2	.4	-1.7	-.9	5.5	3.2	4.9	1.6
1979-85	2.1	.2	-1.8	-1.1	5.9	3.8	-4.1	-7.6
1985-90	2.1	2.3	.3	1.1	4.9	2.8	15.9	12.7
1990-95	2.4	-1.2	-3.5	-2.8	5.5	3.0	5.6	2.5
Italy:								
1979-95	3.8	2.3	-1.5	-1.9	10.0	6.0	1.6	-4.1
1979-85	4.9	1.7	-3.1	-2.9	16.7	11.2	-3.2	-12.9
1985-90	2.6	4.0	1.3	.3	6.9	4.2	14.3	9.8
1990-95	3.7	1.3	-2.3	-2.8	5.5	1.7	-4.3	-6
Netherlands:								
1979-95	3.3	2.0	-1.3	-1.1	3.7	.4	1.8	1.4
1979-85	4.4	1.8	-2.5	-2.3	4.9	.5	-7.6	-8
1985-90	1.9	3.1	1.2	1.4	2.1	.2	12.9	12.7
1990-95	3.3	1.1	-2.1	-2.1	3.9	.6	3.2	2.6
Norway:								
1979-95	1.9	.4	-1.5	-1.5	7.3	5.3	3.8	-1.4
1979-85	2.9	1.0	-1.9	-1.8	10.0	6.9	-2.1	-8.4
1985-90	1.4	-1.8	-3.1	-2.9	8.1	6.6	13.6	6.6
1990-95	1.3	2.1	.8	.4	3.4	2.1	1.9	-.3
Sweden:								
1979-95	3.2	2.0	-1.1	-1.8	7.5	4.2	.9	-3.1
1979-85	3.0	2.2	-.8	-1.2	9.6	6.4	-5.3	-11

Table 2.

Na-
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U.S.
dollars

Table 3. Average annual percent changes in U.S. unit labor costs in manufacturing relative to 13 competitors, selected periods, 1979-95

Country or area								
	1979-95	1979-85	1985-90	1990-95	1979-95	1979-85	1985-90	1990-95
13 Competitors	-0.7	-1.2	-0.9	0.0	-1.7	4.1	-8.3	-1.5
Canada	-1.2	-2.3	-2	1.1	-.2	.2	-5.1	4.4
Japan	1.3	2.5	1.4	-.3	-3.9	4.0	-8.2	-8.6
Korea	-3	-5.1	-4.2	.8	.1	4.7	-8	3.3
Taiwan	-1.9	-3.4	-1.8	-.2	-3.8	-1.7	-9.2	-.5
Europe	-1.4	-2.3	-1.3	-.5	-.7	7.8	-10.4	-.3
Belgium .....	.7	2.1	.1	-.4	.7	14.8	-10.7	-2.9
Denmark	-1.8	-2.1	-3.4	.4	-1.4	10.0	-13.3	-1.6
France	-1.6	-5.3	.6	.9	-.6	7.3	-9	-.9
Germany	-.9	-.1	-1.1	-1.6	-2.4	8.1	-12.3	-.4
Italy	-3.5	-6.8	-2.4	-.4	.7	7.1	-11.1	6.0
Netherlands	1.9	3.2	1.5	.8	.5	12.2	-10	-1.8
Norway	-2.8	-3	-4.6	-.7	-1.5	5.9	-10.5	-.5
Sweden	-1.8	-2.5	-4.6	2.0	1.4	9.4	-11.5	5.9
United Kingdom	-2.1	-3.2	-2.2	-.7	-.3	5.1	-8.2	1.7